Interdisciplinary Research as Collective Interaction

An Investigation of Interdisciplinarity in the R&D Sector of China's Biotechnology Industry

Submitted by Kai Wang to the University of Exeter
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I certify that all material in this thesis which is not my own work has been identified and that no material has previously been submitted and approved for the award of a degree by this or any other University.

Signature: .....

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ABSTRACT

As China has celebrated its economic boom over the past decades, scientific research within the R&D sector of industry has become an active arena for Science and Technology Studies (STS) in understanding how science contributes to social change in China. Two themes are central in this sociological work: the study of secular change in China, in particular, change in its biotech industries exemplified by work in the BGI (formerly known as Beijing Genomics Institute); the investigation of interdisciplinarity in that context. This research sheds new light on explanatory practice in interdisciplinary research (IDR) strategy as patterns of interaction in the social process of scientific knowledge production, and its contribution also includes bridging the sociology of scientific knowledge production and research policy studies.

In this thesis, I examine a number of topics at three interrelated levels of analysis. First, it explores the theoretical development of the academic discipline and the notion of interdisciplinarity, with a focus on the balance of normative and descriptive approaches in understanding their social functionality as embodied by what I name as *Paradiscipline* (the initial stage of IDR project). The second level investigates closely how IDR patterns emerge and evolve in the sequencing-based industrial R&D practice in the case of the BGI. Social, cultural, and institutional factors directing and conditioning collective actions by status groups within interaction network are carefully weighed against the context that scientific expertise speak to power in China's social setting. The last level is dedicated to yield more pervasive implications including the organizational structure of interaction and modelling of scientific research, via comparative analysis of traditional S&T management and governing 'Big Science'. It further addresses the issues around on-site governance of China's biotechnology industry R&D, at both management practice and policy making levels, on the basis of social embedment.

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ABBREVIATIONS

AIR	Academic-Industrial Relationship
AMMS	Chinese Academy of Military Medical Sciences
ANT	Actor-Network Theory
AR	Applied Research
BFA	Bureau of Foreign Affairs
BR	Basic Research
CA	Cultural Analysis
CAAS	Chinese Association for the Advancement of Science
CAGR	Compound Annual Growth Rate
CAMS	Chinese Academy of Medical Sciences
CAS	Chinese Academy of Sciences
CEM	Chinese Educational Mission
CHGDC	Chinese Human Genome Diversity Committee
CT	Cultural Theory
ELSI	Committee of Ethical, Legal, and Social Issues
GGA	Grid-Group Analysis
GSSP	Group Specific Sequencing Primer
HGP	Human Genome Project
HLA	Human Leukocyte Antigen
HMC	Handmade Cloning
HPV	Human Papillomaviruses
HUGO	International Human Genome Organization
IBC	International Bioethics Committee, UNSCO

IDR	Interdisciplinary Research
IDRC	The International Development Research Centre
IGBC	International Governmental Bioethics Committee, UNESCO
ICT	Information and Communications Technology
JCM	Jesuit China Mission
MDR	Multidisciplinary Research
MOE	Ministry of Education, China
MOST	Ministry of Science and Technology, China
NBSC	National Bureau of Statistics of China
NI	New Institutionalism
NIS	National Innovation System
NNSF	National Natural Science Foundation of China
OECD	Organisation for Economic Co-operation and Development
OPP	Obligatory Passage Point
PEST	'Political, Economic, Social, and Technological' Analysis
SARS	Severe Acute Respiratory Syndrome
SCC	*Science and Civilisation in China*
SEZ	Special Economic Zones
SOP	Standard Operating Procedure
SSK	Sociology of Scientific Knowledge
SSRC	Social Science Research Council, US
SST	Social Shaping of Technology
STS	Science and Technology Studies
SWT	Strength of Weak Ties
TR	Technical R&D